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Restaffing the Ironfoundries

Though rehousing has become priority number one, there does not seem to be the same energy displayed for its successful prosecution as was the case in the armaments drive during the war. There has been a recognition since the middle of October by the various Ministries of the real urgency for labour for ironfoundries. We published on November 2, a note dealing with the transfer of redundant labour in non-ferrous foundries to the iron section of the industry, yet it was not until the end of December that official confirmation was forthcoming, a delay of two valuable months! Our correspondents in the various districts after conversations with prominent ironfoundry executives are not too hopeful of any great influx from this source. They all reiterate that ironfounders require their key men back from the Services. Apparently this is easily possible and application should be made through the Ministry of Supply or some other Ministry for release under Class B, and forms are available for this purpose. It is here, however, where the snag arises, as some civil servants interpret these applications according to some printed schedule or other. Thus a clerk or crane driver may, in their view, be ruled out as not entering within the printed schedule. This is a totally wrong view. Key men may be labelled with an assortment of professional or trade designations, but the test is—or should be—will their return make a worthwhile contribution towards the solution of the housing problem? Thus we counsel all foundry owners immediately to utilise to the full the rights they possess under the Class B Services release scheme.

Next we urge the foundry equipment concerns to assume that they are part and parcel of the ironfoundry industry, and if some of the schemes for mechanising this industry are being impeded through lack of draughtsmen, erectors and so forth, to stake their claim under the Class B releases. They can do so with justice, as we are satisfied that at the highest levels of the Ministry of Labour, there exists a real desire to do everything possible to solve the housing shortage problem.

An ancillary subject which requires clarification is a straight unequivocal direction from the Government departments as to whether an individual or a company can start up a new ironfoundry. It is common knowledge that there exist bans concerning the location of industries, and particularly is this applicable to the metropolitan area. Here not only can no new factory come into being but existing ones are apparently not allowed to expand if this involves an increase in the labour price as compared with some rather nebulous datum line. At the moment news is reaching us of the starting up of a new foundry here and there, but simultaneously we hear of a number being refused permission on the grounds of the non-availability of labour. Surely the attitude of the various controls should be as it was in wartime; that is, would these proposed enterprises make a contribution to (1) housing, or (2) exports? If the answer is in the affirmative, as it usually is in the case of ironfoundries, then not merely permission should be given but efforts made to ensure the supply to the new concern of raw materials and labour. Obviously, new foundries should be made to conform initially with the most modern conceptions of good housekeeping. This involves design of buildings, heating, lighting, ventilation, and the latest amenities for the employees. Herein lies the most satisfying type of control and one to which but few would object.

RELAXATION OF EXPORT CONTROL

By the Export of Goods (Control) (No. 8) Order, 1945, the Board of Trade have abolished some of the export licensing requirements. In future, the following will not need export licences for any destination:—

Plates and sheets of iron and steel; hand tools; corundum and emery; mobile cranes; vans, lorries and trucks.

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FORTHCOMING EVENTS

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

JANUARY 11.

Institute of Welding (Birmingham branch):—"Developments in the Technique and Use of Resistance Welding," by R. W. Ayers. At the James Watt Memorial Institute, Great Charles Street, Birmingham, 3, at 7 p.m.

JANUARY 16.

North-Western Fuel Luncheon Club:—"The National Economics of British Petroleum Refining," by Harold Moore. At the Engineers' Club, Albert Square, Manchester, at 12.30 p.m. Followed by visit to the Barton installation of Manchester Oil Refinery, Limited.

Institute of Welding (West Scotland branch):—"The Control of Distortion in Welded Ship Structures," by G. Johnson. At 39, Elmbank Crescent, Glasgow, C.2.

Institute of Welding (Manchester branch):—"Castings and Weldings." At Reynolds Hall, College of Technology, Manchester, at 7 p.m.

Institute of Welding (Liverpool branch):—"Film: "Steel." At Liverpool Technical College, Byrom Street, Liverpool, 3, at 7 p.m.

Institute of Welding (North London branch):—"Submerged Arc Welding," by R. R. Sillifant. At the Fyvie Hall, The Polytechnic, Regent Street, London, W.1, at 7.30 p.m.

Institute of Welding (Sheffield branch):—"Is Welding a Craft?" by G. E. Alpine. At the Royal Victoria Station Hotel, Sheffield, at 6.30 p.m.

JANUARY 17.

Institute of Welding (Tyneside branch):—Presidential address, by Sir Claude D. Gibb, C.B.E. At the Mining Institute, Neville Hall, Newcastle-upon-Tyne, at 6.15 p.m.

JANUARY 18.

Institute of Welding (East Scotland branch):—"The Layout for Welding," by W. A. Roy. At the Heriot Watt College, Chambers Street, Edinburgh, at 7.30 p.m.

Keighley Association of Engineers:—"Arc Welding Problems," by H. F. Tremlett. At Devonshire Buildings, Devonshire Street, Keighley, at 7.30 p.m.

Institution of Mechanical Engineers:—"Recent Extensions to the Steam and Power Plant at a Large Chemical Works," by G. A. J. Begg, W. M. Hebblethwaite, and G. Cooke. "The La Mont Boiler," by G. A. Plummer. At Storey's Gate, St. James's Park, London, S.W.1, at 5.30 p.m.

JANUARY 19.

Institute of Welding (West Scotland branch):—Luncheon. At the Grosvenor Restaurant, Glasgow, at 12.45 p.m.

JANUARY 21.

Sheffield Society of Engineers and Metallurgists:—Presidential address. At the Royal Victoria Station Hotel, Sheffield, at 6.15 p.m.

JANUARY 24

Association for Scientific Photography (Medical Group):—"Medical Photographer, or Photographing Medico," by B. Richardson Billings. At Hastings Hall, B.M.A. House, Tavistock Square, London, W.C.1, at 6 p.m.

JANUARY 25.

Manchester Association of Engineers:—"Colour as it Affects the Engineer in his Business of Everyday Life," by R. F. Wilson. At the Engineers' Club, Albert Square, Manchester, at 6.45 p.m.

Institute of British Foundrymen

JANUARY 12.

West Riding of Yorkshire branch:—"Modernisation and Mechanisation to Aid Foundry Production," by G. W. Nicholls. At the Technical College, Bradford, at 6.30 p.m.

Scottish branch:—"Design as Applied to Foundry Practice," by D. C. Hagen. At the Royal Technical College, George Street, Glasgow, at 3 p.m.

Newcastle-upon-Tyne branch:—"Foundry Controls," by N. Charlton and F. Greaves. At Neville Hall, Newcastle-upon-Tyne, at 6 p.m.

JANUARY 19.

Lincoln section:—"Scientific Measurement in the Foundry," by A. Scattergood. At Lincoln Technical College, at 2.45 p.m.

JANUARY 25.

Birmingham, Coventry and West Midlands branch:—Annual dinner and dance. At the Botanical Gardens, Edgbaston, Birmingham.

JANUARY 26

East Midlands branch:—"Modernisation and Mechanisation to Aid Foundry Production," by G. W. Nicholls. At Derby Technical College, at 6 p.m.

Bristol and West of England branch:—"The Technological Principles of Casting Design," by Prof. V. M. Shestopal (read by J. Rostron). At the Merchant Venturers' Technical College, Bristol, at 7 p.m.

Falkirk section:—"Cupola Practice," by D. H. Young. At the Temperance Café, Lint Riggs, Falkirk, at 6 p.m.

Wales and Monmouth branch:—"Technique in Production of High Strength Aluminium Castings," by A. L. Pendry. At the Engineers' Institute, Cardiff, at 2.30 p.m.

JANUARY 28.

Sheffield branch:—"Place of the Foundry in Industry," by F. Whitehouse. At the Royal Victoria Station Hotel, Sheffield, at 7 p.m.

JANUARY 30.

London branch:—Works visit to Ealing Park Foundry, Limited.

BOOK REVIEW

"Handbook for Electric Welders" (Revised Edition, 1945). Published by Murex Welding Processes, Limited, Waltham Cross, Herts. Price 5s. net.

This is a particularly well balanced book. In the new edition the more elementary aspects have been eliminated, but this is not to say that the practical technique has been side-tracked. Rather has this aspect been transferred to the sectionalised studies of welding of special materials. Herein, cast iron; stainless steel; copper, brass and bronze; aluminium and its alloys, and nickel and its alloys each receive special treatment. The book, which is excellently illustrated, includes several micrographs. These lose much of their usefulness through having no indication as to their magnification.

The book is divided into seven chapters, and includes five appendices, a proportion of which refer to the publishers' own productions. Though the book emanates from a manufacturer of welding rods, this is not at all detrimental to its value; rather does it enhance it, because of the honesty of approach. Reliable general technical information is included, whilst for the particular applications, reference is directed towards their own goods, for which full working data has been evolved, and herein are made available for practical use.

V. C. F.

NEW CATALOGUE

Oil Coolers. The Visco Engineering Company, Limited, of Stafford Road, Croydon, has just issued Publication No. 458, which illustrates and describes a patented oil cooler. It has been given the name "Sprayblast," and it is claimed that this is the first oil cooler to use a mixture of air and water instead of either air or water alone, as is normal practice. It is said to incorporate the advantages of both without their disadvantages.

THE APPLICATION OF ETHYL SILICATE TO FOUNDRY PRACTICE*

By CLIFFORD SHAW, B.Sc.

For years before the war it was known, though not widely, that refractory bodies could be produced by using as the cement or binder for refractory aggregates certain interesting liquids called silicon esters. As foundrymen have not necessarily a chemical training, it seems desirable at the outset to explain in a very simplified way what these esters are and why they act as cements in this manner.

Production of Silicon Esters

An ester is the product of a reaction between an acid and an alcohol—in this case the acid side is silicon or silicic acid, and since there are a number of alcohols, there are a similar number of silicon esters. The ester of ethyl alcohol (or industrial methylated spirit) is, however, at once the most convenient and so far, on the whole, the best, and one can, therefore, forget the rest for the present and concentrate on the ethyl ester or ethyl silicate.

Ethyl silicate is produced in these stages. First, chlorine is passed over heated metallic silicon to produce $SiCl_4$—a yellow, fuming liquid. The $SiCl_4$ is then reacted with ethyl alcohol to form the ester plus HCl, as set out in Equation 1.

(1) .. $SiCl_4 + 4C_2H_5OH \rightarrow 4HCl + Si(OC_2H_5)_4$

Silicon Tetra-chloride — Ethyl Alcohol — Hydrochloric Acid — Tetra Ethoxy Silicane (Silicon Ester).

This equation holds good only if *dry absolute alcohol* is used.

It will be noticed, however, that this refers to dry or absolute alcohol, and the product is the simple chemical entity tetra ethyl silicate, which has a silica content of 28 per cent. and has been used both in America and over here for the production of precision casting moulds. In order to obtain a binder, the Si(OEt), must be hydrolised, *i.e.*, given moisture. With a large excess of water the reaction shown by Equation 2 takes place.

(2) .. $Si(OEt)_4 + 4H_2O \longrightarrow Si(OH)_4 + 4EtOH$

Silicon Ester — Water — Silicic acid — Ethyl Alcohol

$Si(OH)_4$ —heat→ SiO_2 Silica.

If a small amount of water be used (such as that normally present in industrial alcohol), *condensation* takes place, giving the series of complex ethyl silicates shown in Table I.

Thus the liquid ultimately yields silica and alcohol—silica being, as is well known, very refractory, and alcohol, as is equally well known, very easily eliminated. It will be obvious, therefore, that by using wet alcohol, *i.e.*, industrial methylated spirit, in the final reaction, complications are set up by doing some hydrolysis at the outset. The effect is to produce the reaction called condensation, which produces gummy high boiling "concentrated" silicates which raise the Si content.

Table I, which is based on Mellor's table for the silicates, shows some of the possible condensed ethyl silicates, with the silica content of each molecule given below. Individual compounds in the various series (ortho, meta, etc., shown horizontally) are derived from the preceding member of the series by condensation of two molecules, with one molecule of water at each stage. The vertical members—mono, di, etc., are derived from the member immediately above by internal condensation. The last members of each internal condensation series (vertical) would be written down as silica.

Alkali Addition

When fully hydrolised, the liquid is unstable, *i.e.*, it will turn to a jelly in a comparatively short time, and the addition of an alkali will so shorten this time that the cement may be set as convenient by varying the amount of alkali. The amount of water added to the system by the use of industrial methylated spirit during manufacture is not sufficient to cause instability. Fig. 1 is a graph taken from King's Paper,* which

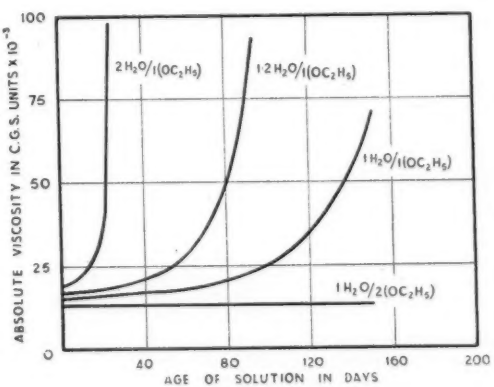


FIG. 1.

*A Paper read before the London branch of the Institute of British Foundrymen and the Institute of Metals.

*Journal of the Oil and Colour Chem. Assoc., vol. xiii, No. 116, February, 1930.

The Application of Ethyl Silicate

shows viscosity against time for various water additions. The flat line corresponds to ethyl silicate as made in this country, having one molecule of added water, and in practice such liquids have been kept for years unchanged. The Author's colleagues have found another way of bringing about this set, which is in many ways simpler and more effective. It should be noted that the hydrolysis of silicon ester, to give a hard bond, must be carried out with meticulous attention to detail, and any variation can give rise to headaches—moulds that do not set, crack when baked, etc.

able to reduce some of these difficulties. Briefly, it has been found that certain substances, which may be called condensing agents, encourage the formation of strong gels and sound moulds—in other words, they guide the rather complicated reactions of the hydrolysing silicates in the way they should go. In their presence hydrolysis is a simple matter of adding a small amount of wet alcohol, and the co-agent itself gives the necessary control of gelation by causing preliminary set without other addition.

The binder is not diluted unless it is desired to do so, and the hydrolysis process goes on in the mould instead of being carried out by a tedious preliminary operation.

TABLE I.—*Showing the Complex Ethyl Silicates Resulting from Limited Water Additions (King, J.O.C.C.A., vol. XIII, No. 116).*

	Type	Mono	Di	Tri	Tetra	Penta
Ortho	$(C_2H_5)_{2n}+_2Si_nO_{3n}+_1$ ortho	$(C_2H_5)_4SiO_4$ 28.9	$(C_2H_5)_6Si_2O_7$ 35.1	$(C_2H_5)_8Si_3O_{10}$ 37.8	$(C_2H_5)_{10}Si_4O_{13}$ 39.3	$(C_2H_5)_{12}Si_5O_{16}$ 40.3
Meta	$(C_2H_5)_{2n}Si_nO_{2n}$ meta	$(C_2H_5)_2SiO_3$ 44.8	$(C_2H_5)_4Si_2O_6$ 44.8	$(C_2H_5)_6Si_3O_9$ 44.8	$(C_2H_5)_8Si_4O_{12}$ 44.8	$(C_2H_5)_{10}Si_5O_{15}$ 44.8
Deutero	$(C_2H_5)_{2n}-_2SiO_{3n}-_1$ deutero	—	$(C_2H_5)_2Si_2O_5$ 61.9	$(C_2H_5)_4Si_3O_8$ 54.9	$(C_2H_5)_6Si_4O_{11}$ 51.9	$(C_2H_5)_8Si_5O_{14}$ 50.3
Tritero	$(C_2H_5)_{2n}-_4Si_nO_{2n}-_2$ tritero	—	—	$(C_2H_5)_2Si_3O_7$ 70.9	$(C_2H_5)_2Si_4O_{10}$ 61.8	$(C_2H_5)_6Si_5O_{13}$ 57.5
Tetrero	$(C_2H_5)_{2n}-_6Si_nO_{2n}-_3$ tetrero	—	—	—	$(C_2H_5)_2Si_4O_9$	$(C_2H_5)_4Si_5O_{12}$ 71.6
Pentero	$(C_2H_5)_{2n}-_8Si_nO_{2n}-_4$ pentero	—	—	—	—	$(C_2H_5)_2Si_5O_{11}$ 89.6

(The figures underneath the formulæ give the silica content percentage.)

Hydrolysis, according to the old technique, is carried out as follows. Water itself cannot be added since it is not soluble in ethyl silicate. Alcohol is therefore used as a mutual solvent or carrier for the water. To industrial methylated spirit is added distilled water and a trace of HCl, of which the *p*H value must be finely controlled. This mixture is added in an exact proportion to ethyl silicate and the mixture shaken at intervals until a froth appears. Further spirit is then added and the solution stored for a specific time before use. The period during which it can be used without adjusting the solids is then very limited—a few hours.

Condensing Agents

Throughout, careful attention is necessary in respect of mixing technique, temperature, *p*H value, etc., and it will be agreed that to the ordinary foundryman the whole process sounds, and is, rather formidable. The new method, to which reference has been made, was worked out in order that the foundryman should be

Foundry Properties

Summing up, therefore, there is provided a liquid (quite stable, being only partially hydrolised), with which is mixed suitable aggregates, in this case sillimanite. The mixture will set in, say, 15 min., when industrial alcohol is added. The setting time may be varied between 5 min. and 5 hrs., according to the amount of water added and the concentration of the condensing agent. The mixture may be a slurry or a putty, according to proportions, and personal feeling is that it can find many uses in the foundry industry. In effect, there is available a cold setting refractory cement with the following properties:—(1) Controlled setting ; (2) dimensional constancy during setting and baking; (3) refractory to *circa* 1,600 deg. C.; (4) adequate and easily varied mechanical strength, and (5) easily stripped at cold-set stage.

Beyond the presentation of this Paper, there is a second objective, and that is to show the audience what the material is like and how it works, and as

far as possible in a limited time to suggest some of the different methods by which a variety of problems can be solved. It is certain that when experienced foundrymen, who are skilled in its technique, which the Author does not pretend to be, begin in earnest to work out their own technique, the application of ethyl silicate can be a considerable factor in the industries' progress and in meeting future competition.

Moulding from Wax Models

Hitherto, interest has been directed almost exclusively to precision casting of small objects by the lost wax technique—since Mr. Dunlop's excellent Paper* describes this fully, it is not proposed to recapitulate beyond stating that wax models of the object to be cast are prepared with allowance for shrinkage. The model is sprayed with a fine fluid mixture of filler and binder. The dry-coated model is completely surrounded with an investment of the refractory mixture in slurry form. The resulting mould is baked, first to melt out the wax, and secondly to harden the mould. The molten metal is poured or injected into the cavity. The cold mould is broken away and the casting trimmed and sand blasted.

Note that the production of exact wax models is the essential—not an easy business, and that the mould and model are expendable. Moreover, the investment or mould is produced by the vibration of the particles in an excess of expensive binder, and the whole technique is essentially foreign to normal foundry practice. In spite of these disadvantages, there will remain cases where no other method is feasible because of the intricacy of the parts, and in those cases the use of the bonding liquid described will at least simplify the process.

A few interesting points on the method are here given, extracted from an article in the "Iron Age":—(1) Design may be freed from restrictions hitherto imposed by machining practice limitations;* (2) as cast-grain size is large, but after heat-treatment castings compare favourably with parts machined from stock bar or drop forgings of same analysis. Ductility values are often lower than rolled or forged material; (3) important economies in smaller quantities, but cannot compete with well-tooled machining methods for very large quantities, and (4) summarising conclusion is: "Physical and metallurgical tests indicate complete suitability of precision-cast material for countless uses."

Semi-dry Piece Mould

Another method, and one which we are anxious to see more fully tried, is the "semi-dry piece mould." Here the wax model is eliminated and the mould is made from a master pattern direct. In this case one does not use an excess of expensive binder liquid, and under favourable conditions the mould is used many times. The chief difference in material property is that, whereas in investment casting the mould must be readily broken away and, therefore, not harder and stronger than necessary. In this second case a strong hard mould is needed. Fortunately, the use of maximum silica content condensed silicate gives adequate strength, and since so much less is used, the lack of dilution still leaves one on the credit side.

To make a simple split mould only a putty cement is applied to the half model, and when this has set the other half is moulded to it. As in the case of investment casting, or indeed any method, pouring gates, etc., are incorporated with the model, and it is unnecessary to stress the importance of their correct design to an audience of foundrymen. Such a mould in the lower melting point metals could be used many times. Where the case is not so simple, a method developed by Mr. Noel Shaw may commend itself.

Here, again, a single pattern which may be of metal or of wood is used. It is suitably coated with, for instance, cellulose lacquer. Shellac is not suitable, being alcohol soluble. From the master model is produced a master piece-mould in any suitable plaster, or *e.g.*, magnesium oxychloride. It must be dowelled on stripping faces and be capable of re-assembly. This master mould is assembled on the model with one piece missing. The cavity as left is filled with the plastic refractory mix. When set an adjoining piece is removed and similarly replaced with refractory, and so on. By this method the following advantages accrue:—(1) Internal surfaces can be examined or any faults corrected before assembly; (2) special treatment such as graphite coating can be easily applied, and (3) chills can be accurately placed in the mould or inserts in the mould cavity.

Scope with Large Castings

The Author has so far considered, and as far as demonstration goes the audience must be satisfied with, only comparatively small jobs, but a field certainly exists for improvement of surface of very large castings and the reduction on fettling. Here, reasons of economy would enforce a composite mould having a varying thickness of the comparatively expensive mix at the surface meeting the metal and using cheaper materials as backing. Only one attempt along these lines has, as far as the Author knows, been made, but this showed ample promise, and some foundryman will no doubt some day bring it to success. One sees no reason why the backing should not proceed with sand, and since in such cases repetition would not be desired, this would be quite in order.

Whether the Sandslinger and other moulding techniques can be used unchanged with semi-dry mixtures using ethyl silicate, the Author has no experience, but he can see no insuperable obstacle, and he is convinced that the use of slurries as coatings can also be of service. In short, normal foundry technique has in personal opinion been insufficiently considered in relation to ethyl silicate. It is a hope that it will be, and if this Paper helps in that development its aim will have been achieved.

*"Precision Casting by the Lost Wax Process," by Adam Dunlop, F.T.J., February 8, 1945, page 107.

NOTES ON SAND CONTROL FOR MAGNESIUM CASTINGS

By D. R. ANDREWS

Natural sand is not suitable for moulding purposes for magnesium castings, as control of its properties is difficult. A washed and graded silica sand is most widely used; this synthetic sand should be of a uniform grain size to provide maximum permeability because of the low density of magnesium. If the sand be not sufficiently permeable, gas pockets will provide serious resistance to the molten metal flowing through the mould. A periodic sieving analysis by the operating foundry will ensure that uniformity of the grain size of the sand supplied is kept under control.

A typical sieving analysis for Bedford sand is as follows:—

Sieve	*Percentage*
+ 16	0.10
− 16 + 22	0.40
− 22 + 36	7.00
− 36 + 44	14.30
− 44 + 60	52.74
− 60 + 100	23.50
− 100 + 150	1.60
− 150 + 200	0.15
− 200 + 300	0.02
− 300	0.19

With a large percentage of sand contained in the −44+60 sieve, permeability in this sample is adequate.

Suitable Bonding Materials

This sand is without natural bond, therefore a bonding material must be added to it. A suitable substance is either No. 1 or No. 4 Fulbond, or 4 per cent. bentonite is sufficient. The bond should be mixed in dry with the sand, then the water containing the inhibitor in concentrated solution should be added. This mixture will form a plastic mass suitable for moulding. A milling time of 30 minutes is desirable to ensure a thorough mixing and that the compressive strength (5 to 7 lbs. per sq. in.) and high permeability is attained. The percentage of water to be added to the batch of sand must be such that the sand is plastic enough for moulding and yet not be so high that a violent reaction will occur between the molten metal and the moisture in the sand. A figure between 3 and 4.5 per cent. is suitable, but even this minimum of water must be prevented from reacting with the metal. This is achieved by the use of a chemical which will produce an atmosphere on heating which provides a protective coating over the surface of the sand.

The chief chemicals used for this purpose are sulphur, boric acid and ammonium bifluoride. They are commonly called inhibitors. The method used in Great Britain largely embraces the last-named chemical. The former two are usually combined in the percentage 3 to 10 per cent. sulphur and 1 per cent. boric acid. The fluoride is used generally in the quantity of 4 per cent. Careful control must be exercised over the amount present, and the figure should not be allowed to decrease more than 1 per cent. below the figures quoted, otherwise serious defects will occur in the castings, and if the percentage becomes very low, the casting operation will prove dangerous.

Facing Sand

The percentages given are for facing sand, that is, all sand in direct contact with the molten metal. A fair amount of inhibitor will still remain in the facing sand after its use, and as regards ammonium bifluoride a 2 per cent. addition of the chemical in the remilling operation will suffice, providing the used facing is only used for packing purposes in subsequent moulds. It is advisable to use only a new batch of sand for facing purposes. Before remilling the used sand it must be put through a sieve and the hard lumps discarded. A sulphur-boric acid sand produces castings silvery white in appearance, while the fluoride sand produces castings with a dull blue colour on their surfaces. The latter film has been found to possess to a limited extent the property of resisting corrosion.

Oxidation of the molten magnesium entering the mould is kept under control by the passing of sulphur dioxide gas through the mould just before pouring and by the dusting of the metal with sulphur as it is entering the mould on top of the risers immediately after pouring is completed.

Core Sand

For similar reasons as are given earlier, the core sand for magnesium castings must possess high permeability and sufficient strength. If the strength be too high, the core, being very strong, will not give way to the solidifying metal and will most probably cause cracking in the casting; again, if the strength be low, the sand particles may be washed into the flowing metal and cause inclusions in the casting.

A synthetic core sand is necessary to fulfil these requirements, and a suitable composition is given in the following: Bedford (or similar sand) to which is added 3.5 per cent. bonding material (Fulbond or bentonite); 3.5 to 4 per cent. sulphur; 0.3 per cent. boric acid, and 3.0 per cent. water.

A suitable oil-bonded core sand is as follows:— Bedford sand (graded), to which is added 2 to 4 per cent. of a proprietory oil binder (*e.g.*, "Glyso"); 1 per cent. of bentonite; 1 per cent. sulphur, and 0.3 per cent. boric acid.

GIANT RAIL PRESS FOR RUSSIA

What is described as a giant rail press weighing about 665 tons has been built by the E. W. Bliss Company, Brooklyn, for use in Russia's automobile industry. The press, according to a recent issue of the "Iron Age," is one of the largest ever built, and exerts a pressure of 2,500 tons.

PATTERNMAKING FOR SMALL BATCH, MACHINE MOULDED CASTINGS*

By A. G. SQUIRES

A personal conception of "what should be done" will naturally be influenced by training and by what one has seen applied, and the approach to a job will be governed by this knowledge. Thus, it is not unnatural for executives to regard as "standard practice" the methods used in their own patternshops. There are usually several "possible" ways of doing a job, all of them good practice under proper conditions, and while there must be a best way to do every job, such best method will not be common to all jobs nor to all foundries; such a method must be decided, bearing in mind such factors as the design of the casting, and the available labour and equipment.

Where the design and size are suitable, the quickest and cheapest method is to mount a wooden pattern directly on to moulding plates; the time taken in patternmaking, plus about half a day for mounting, being about as quick as one can expect to get the patterns into the foundry; any subsequent process for multiplying the number of patterns, usually by moulding and casting in metal or plaster, being additional, and as a master pattern will be needed, the need for duplication will depend on the possible number of castings per moulding box and on the cost of moulding. Another point to be borne in mind is uniformity of product, as any pattern reproduction has its own risk of inaccuracy, however small that may be.

Plaster Patterns

When the casting is of such a size that a number of patterns are needed, in cases where one-half of the pattern will fall below the face of the moulding plate, or one irregular jointed work, a method of making a pair of pattern plates, having in this case six plaster patterns, matched and produced from a single master pattern, will be described. The success of this method depends on the special sand used in the moulding process; this permits hard ramming and fine detail. It is the French patternmaking sand from Fonte-aux-Roses, near Paris. That used in this demonstration is about 10 years old and, although it has lost some of its valuable properties, it is still superior to any other known sand (that is, of course, as far as the writer is concerned). For those interested in figures, a test made on this batch showed a moisture content of 6.6 per cent., permeability No. 179, and a compression of 6.4 lbs. per sq. in.

To work the process for plain jointed work, it is usual to work with a pair of boxes and an oddside, this first being placed on a surface plate and rammed hard, thus producing a box filled with sand; a half box is placed on the oddside and the process continued, and finally the box proper assembled and the operation repeated, thus giving three half boxes, each rammed solid with sand.

Fig. 1 shows the oddside, lightly marked out, with the pattern in the first position. It also shows the top half box in position, and after dusting the joint with parting powder, the top is rammed. The corresponding portion of the lower box is then cut away, and Fig. 2 shows the top half box with the pattern in the first position, ready for ramming part one of the bottom half. Fig. 3 shows the pattern back on the oddside, but in position No. 2, the top half mould ready cut out for moulding. Fig. 4 shows the bottom half prepared.

Limitations of Process

This process of cutting out one section at a time is continued until the boxes are complete, and Fig. 5 shows the pair of moulds with runners cut, ready for making the plaster patterns. The next step is to locate a shallow metal frame on each half mould and pour in the plaster compound (Fig. 6). The next picture shows the pair of plaster plates finished and ready for use. The time taken on this process varies with the type of job, but an allowance of one day for moulding and two days for the plaster to dry out is reasonable. The process has its limitations, and they are chiefly on deep drawn work, where insufficient sand

FIG. 1.—SHOWING THE ODD SIDE LIGHTLY MARKED OUT.

* A Paper read before the Birmingham, Coventry, and West Midlands branch of the Institute of British Foundrymen, Mr. A. J. Shore presiding.

Machine Moulded Castings

would be left to resist the ramming of the duplicate patterns, but where the mechanical strength of the rammed moulds is sound the method is admirable.

Gauge for Locating Patterns

In conclusion, and perhaps in lieu of an apology for such a brief sketch of these sections of pattern-making, the Author offers details of a gauge which is useful in locating patterns on moulding plates. It may be used for wood or metal patterns; it is accurate, provides a ready check should matching be queried, and it can be made in the patternshop. The body of the gauge, as is shown in Fig. 7, consists of a light alloy casting in the form of a "U" frame, about $\frac{5}{8}$ in. thick; it has lugs at each open end with centres corresponding with those on the moulding plates. One is bored to fit the box pin, and the other has an open-ended slot; the width of the slot fits the pin, and its length not only permits easy setting over the pins, but gives location from only one pin.

Assuming there is a pair of half patterns to mount on a pair of plates, the procedure is as follows:—

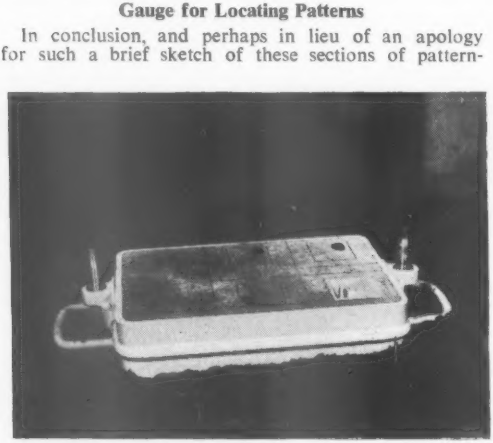


FIG. 2.—TOP HALF BOX WITH THE PATTERN IN THE FIRST POSITION.

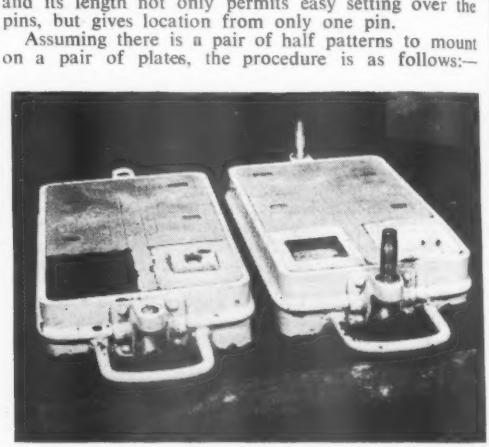


FIG. 4.—THE BOTTOM HALF AS FINISHED.

Determine where the pattern is to be fixed; place on half in position and scribe round it. Drill any necessary fixing holes, and fix the half pattern on one plate. Now fix two pins on the plate and place the jig in position. It will be noticed that there are a number of holes drilled in the jig; these are to take

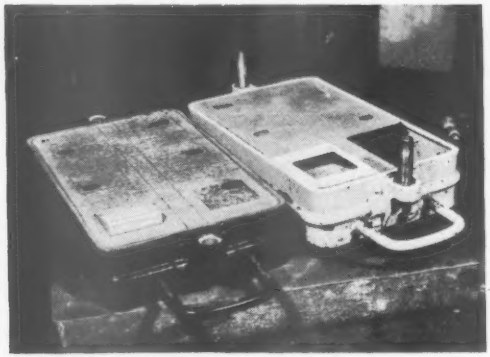


FIG. 3.—SHOWS THE PATTERN BACK ON THE ODD IN POSITION NO. 2.

FIG. 5.—PAIR OF MOULDS READY FOR MAKING THE PLASTER PATTERNS.

the locating rods made from ¼-in. dia. steel, with the ends swaged to form a Tee end and afterwards ground square and hardened. The Tee is of the same dimension as the thickness of the frame. The rods are fitted into their appropriate holes and pushed out to make contact with the pattern, and they are locked in position by Allen screws engaging on flats on the rods. One is thus able to fix one half pattern by the quickest possible method and without any marking out, and pick up its position in relation to the box pins with the gauge.

Test for Accuracy

To set the corresponding half pattern, it is merely necessary to place pins in the other plate, reverse the gauge and place in position, and set the pattern in its place against the stops. The gauge may be used for mounting a number of patterns on plates, and perhaps the best test for its accuracy is to mount, say, four discs on one plate, first fixing one in position as master. Taking the location from it, reverse the gauge, first, about the axis of the pin centre, fix the second disc; reverse again from end to end, and thus mount the four discs from the one location. Make a runner and mould "up and down," that is, using the same plate for top and bottom moulds, and if the boxes

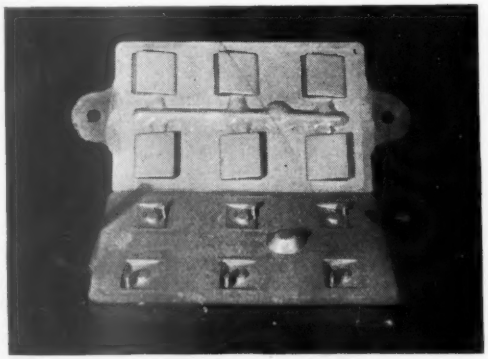


FIG. 6.—A PAIR OF PLASTER PLATES FINISHED AND READY FOR USE.

and pins are true a set of four perfectly-matched discs will be cast.

To check the matching of existing patterns, a set of three feeler gauges, such as is shown in Fig. 8, is necessary, one, say, of ¼-in. sq. steel is a zero gauge, with two others; one 0.005 in. over size and 0.005 in. under size. Place the gauge in position and set the sliding rods, first placing the zero feeler between the rod and the pattern; set each rod accordingly. Reset the gauge on the other plate and check the gap between each rod and the pattern, first with the small feeler, which should "go," next with the "no go" or over size, and if these are correct, test with the zero feeler for final proof of accuracy.

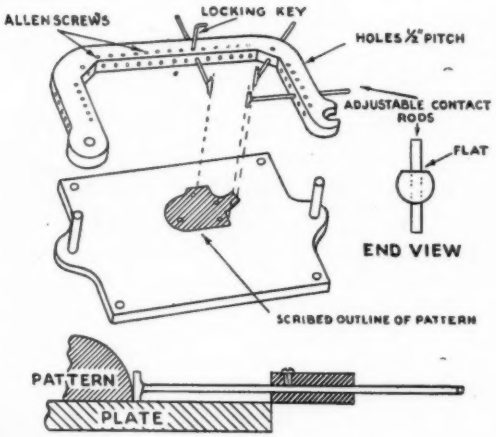


FIG. 7.—SETTING GAUGE FOR PLATE PATTERNS.

The writer is indebted to the publicity department of W. & T. Avery, Limited, for their kind assistance in illustrating this short Paper.

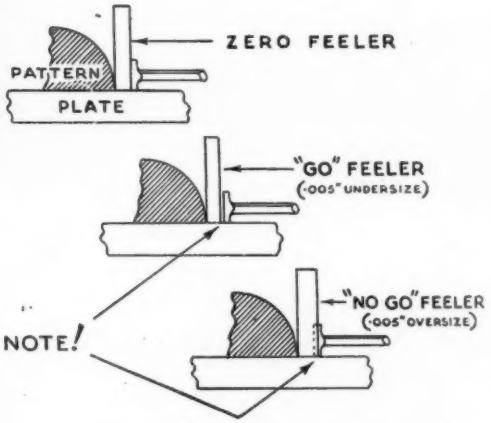


FIG. 8.—GAUGES FOR CHECKING.

FUTURE OF FUEL EFFICIENCY ORGANISATIONS

CO-ORDINATION OF WORK PROBABLE

The position of fuel efficiency organisations, which have hitherto operated under the Ministry of Fuel and Power, has not been defined in the new Government Bill for the nationalisation of the coal industry, and the inference is that these bodies will not form part of the organisation to be set up under the National Coal Board, writes our Scottish reporter. It is understood that the Minister attaches the very highest importance to this side of the coal problem, and that a long-term policy is being formulated to make these largely voluntary organisations a permanent feature of Government administration. The object will probably be to co-ordinate the work of the fuel efficiency committees with the research and scientific groups under one new department, working directly under the Minister himself.

The Scottish Fuel Efficiency Committee has just made a recommendation to the Government that before any new housing project is embarked upon, the local authority, or other parties responsible, should bring competent heating engineers into consultation, so as to ensure that the provision of heating facilities will accord with the scientific and technical knowledge available. It is also suggested that all new heating and combustion appliances—stoves, fireplaces, etc.—should conform to an agreed minimum standard of efficiency, and only apparatus reaching this standard be allowed.

Shortage of Equipment

There is a shortage at present of industrial and domestic equipment, and an appeal is being made to the Government by local authorities to see what can be done to provide greater priority to makers, in order that the housing programme will not be hindered for want of adequate supplies. Scotland's interest in this matter is considerable. Her own manufacturers provide normally about one-half of the total output in Britain of domestic heating and cooking appliances, while the position of Scottish users with regard to heating equipment is generally considered to be very much out of date.

PRICES OF CHROME ORE AND CONCENTRATES

The Ministry of Supply announce that the following prices for chrome ore apply as from January 1, 1946:—

Refractory Grades.—Rhodesian Imperial grade, £11 7s. 6d. per ton; Transvaal, 1st grade, £9 5s.; Grecian, 1st grade, £12 7s. 6d.; Grecian, 2nd grade, £11 10s.

Metallurgical Grades.—Rhodesian lumpy metallurgical, £11 15s. per ton; Rhodesian washed friable, £11 15s.; Baluchistan, £11 7s.

Chemical Grades.—Rhodesian Dyke chemical, £11 10s. per ton; Transvaal chemical concentrates, £11 7s.; Baluchistan, £11 7s.

These prices are all f.o.r. consumers' works.

NICKEL PRODUCTION AND CONSUMPTION

A report by Mr. Robert C. Stanley, chairman and president of the International Nickel Company of Canada, Limited, states that deliveries of Canadian nickel to all markets in 1945 were approximately 25 per cent. under the peak levels attained during the war years, but were in excess of all but one peacetime year.

Up to VE Day practically all nickel went into war uses of the United Nations. In the six years beginning in September, 1939, the company produced and delivered to the United Nations about 1,500,000,000 lbs. of nickel in all forms. The present enlarged nickel capacity of Canadian products is nearly 320,000,000 lbs. annually. The largest annual pre-war nickel consumption by the world was approximately 240,000,000 lbs. in 1937. From this it would appear that Canada's nickel capacity is greater than the world's peacetime requirements, says Mr. Stanley. He regards long range prospects as favourable, however. The war utilised more technically advanced equipment than ever before, and nickel was employed in most of its construction. Since much of this equipment will be produced for peacetime applications, nickel's usage will be broadened.

DEATH OF TWO AMERICAN FOUNDRYMEN

From the United States we have received news of the death of Mr. David McLain and Mr. John Hill, both of whom were prominent foundrymen.

Mr. McLain was born in Ireland 82 years ago; he went to the United States at the age of five. After a typical foundry career, he popularised, by means of a correspondence course, a system of making iron castings under controlled conditions. This he called "semi-steel," as he used quantities of steel scrap in the charge. The name was somewhat unfortunate. Mr. McLain was awarded the Whiting gold medal of the American Foundrymen's Association in 1936. Earlier his work had been recognised by the Institute of British Foundrymen, which elected him an honorary member in 1922.

Mr. John Hill, who was also 82 years of age at the time of his death, was the founder of the firm of Hill & Griffith, foundry supply merchants. He was a founder member of the American Foundrymen's Association, and was made an honorary member of the Association in 1944. Mr. Hill visited Europe on several occasions.

IMPERIAL COLLEGE UNION VACATION WORK SCHEME

The eleventh annual report of the Imperial College Union reveals that last year 467 students were placed with 230 firms, of which no fewer than 40 operated foundries. Whilst the scheme is supported by some of the largest concerns in the country, quite modest companies also participate. One entering this latter category is a foundry equipment manufacturer. The scheme is commended as one which shows potentialities in the direction of recruiting high-grade personnel to the foundry industry.

IRON AND STEEL PRICES INCREASED

FIRST GENERAL ADVANCE SINCE 1940

The Minister of Supply has made the Control of Iron and Steel (No. 46) Order, 1945 (which consolidates all previously subsisting Orders except the Scrap Orders and the No. 44 Order relating to the use of tinplate in the production of certain articles) and the Control of Bolts, Nuts, etc. (No. 9) Order, 1945.

The main purpose of these Orders, which came into operation on December 31, is to provide for higher maximum prices in relation to current costs of production. Prices have in general remained stabilised since 1940, despite higher costs, particularly of coal and imported iron ore, the latter due mainly to increased freights. The special arrangements made with the industry to maintain 1940 prices are being generally discontinued. Limited assistance in the case of freights on imported ores is being continued for the present.

The basis price of pig-iron is increased by 20s. a ton. In general, the price increase on the main steel products is about 5 per cent. On the more highly finished products the increases are in some cases greater and in others less than this figure. It has been possible, however, to reduce by about £2 per ton the price of motor-body sheets made on the strip mills.

Control Amendments

The following price control amendments have been made:—(*a*) Iron ore and cinder and scale are freed from price control. (*b*) Where material is produced to meet unusual requirements, the Minister of Supply may authorise an addition to the maximum price. (*c*) The maximum prices formerly applied to all sales and purchases except where delivery was made outside the United Kingdom or on board a ship for exportation outside the United Kingdom. The exceptions have been widened to include sales within the United Kingdom so long as the material is ultimately exported without having been subjected to any use or treatment.

Other amendments are that electrical stampings are freed from all control; all restrictions on the use of cinder and scale are removed; and restrictions on the acquisition and disposal for export of springs and certain wire products are removed.

Details of the Changes

The following is an outline of the price alterations made as a result of the No. 46 Order:—

Pig-iron.—Hematite, increase of 20s. per ton. Hematite pig-iron extras, no change. Foundry and forge pig-iron, basis prices increased by 20s. per ton and quality differentials adjusted. Low-phosphorus foundry pig-iron, increase of 20s. Staffordshire blast-furnace low-phosphorus foundry pig-iron, increase of 25s. Scotch foundry pig-iron, increase of 25s., and quality extras also increased. Cylinder and refined irons, increase of 20s. Refined malleable pig-iron, increase of 20s. Cold-blast pig-iron, increase of 35s. Blast-furnace ferro-manganese, increase of 20s. Spiegeleisen, increase of 10s.

Forging Ingots.—Increase of 15s. per ton.

Billets, Blooms and Slabs.—Re-rolling billets, basic increased by 7s. 6d. per ton with larger increases on special qualities; extras list revised. Forging billets, basic increased by 7s. 6d. per ton with larger increases on special qualities; extras list revised. Forging quality differential now 17s. 6d. per ton for all qualities. Blooms to Admiralty specification, increase of from 7s. 6d. to 16s. 6d. per ton in large sizes; small sizes increased by 16s. 6d. per ton basic to £1 14s. 6d. per ton acid. Tube steel billets, increase of 12s. 6d. for squares and 25s. for rounds. Gun billets, no change.

Tinplate and Sheet Bars.—No change.

Alloy Steel Billets and Bars.—Increase of around 5 per cent. New small quantity extras for lots under 4 tons.

Alloy Steel Wire Rods.—Prices increased by approximately 5 per cent.

Stainless Steel and Iron.—Bars increased by 2½ per cent.; sheet and strip by 10 per cent.

Shell Steel.—No change in prices of shell quality steels and armour-piercing steel.

High-speed Steels and Substitutes.—No change.

Wire Rods.—Increase of 9s. per ton on basic quality with larger increase on special qualities.

Manufactured Iron.—Crown iron increased by £3 15s. per ton; No. 3 and No. 4 bars by 30s. Wrought-iron sheared strip, increased by £4 17s. 6d. per ton.

Plates and Sections

Heavy Steel Products.—Bars, sections and plates, steel sheet piling, and military bridge sections, increase of 16s. per ton.

Rails.—Heavy rails, increase of 16s. 6d. per ton and new extra for heavy flat bottom rails. Light rails, increase of 21s. on rails and 61s. on fishplates.

Colliery Steel.—Colliery arches and accessories, increase of from 7s. 6d. to 21s.; extras list revised. Pit-props, increase of 5 per cent.

Re-rolled Steel Products.—Bars, sections and hot-rolled strip, increase of 16s. 6d. per ton on basic and larger increase on special qualities; service extras increase of 50 per cent. Cold-rolled strip, prices of mild steel strip increased by 16s. 6d. per ton with larger increases for special qualities and certain increases in extras. Glazing tees, sash and casement sections, and gate channels, increase of 16s. 6d. Certain increases in extras on gate channels.

Bright Steel.—Bright carbon steel bars and bright drawn flats, increase of 19s. 3d. for untested material and 25s. for tested qualities and larger increases for special qualities.

Sheets.—Uncoated steel sheets, basis price increased by 10s. per ton; special quality and auto-body sheets from strip mills reduced; general revision of extras. Coated sheets, increase of 25s. Electrical sheets, increase varying with quality. Cellactite sheets, surcharge increased from 33⅓ per cent. to 35 per cent. Robertson's sheets, surcharge increased from 22 per cent. to 24 per cent.

Tinplate, Terneplate and Blackplate.—Tinplates, increased by 2s. 9d. per box; uncoated plate, increased

by 1s. 3d. per box. Tinned sheets, increase of around 10 per cent. Terneplates, increase of 5s. 3d. per box. Blackplates, increase of £2 15s. per ton on basis prices; no change in general extras.

Tubes and Pipes

Tubes, Pipes and Fittings.—Gas List tubes and fittings, discounts on main qualities reduced by 1¼ per cent., and special length extras increased, giving an average increase in price of about 3½ per cent. Commercial hot finished tubes (Gas List sizes), reduction of discounts by from 1¾ per cent. to 3 per cent., according to size; special length extras increased. Commercial hot finished tubes (other than Gas List sizes), increases of from 22s. 6d. to 30s. per ton; galvanising extra increased by 10s. per ton. Hot finished seamless tubes (to B.S.S. 806B), increases of from £1 to £2 per ton; galvanising extra increased by 10s. per ton. Steel pipes to B.S.S.534, increases of from 7d. to 8s. 6d. per ft., according to size. Hot rolled carbon steel hollows, increases of from £2 12s. 6d. to £3 5s. per ton, according to size. Perkins tubes, increases of from ¾d. to 1¾d. per ft., according to size. Loose flange tubes and fittings, discounts reduced by from 3½ per cent. to 4¼ per cent. Wrought-iron and hot finished boiler tubes, percentage addition to list increased by 16½ per cent. on wrought iron and 5 per cent. on steel. A.P.I. line pipe, increases of from ¾d. to 4¼d. per ft., according to size. Steel conduit tubes, percentage additions to list increased by from 2½ per cent. to 5 per cent. Cold-drawn mechanical tubes, increased by 9½ per cent. Cold-drawn boiler tubes, increased by 11 per cent. Admiralty cold-drawn boiler tubes, increased by approximately 12 per cent.

Cold-drawn electrically welded tubing, increased by 10 per cent. Electrically welded tubing, increases of 7½ per cent. on cold rolled and 10 per cent. on hot rolled. Aircraft steel tubing, varying increases averaging 7½ points; certain quantity discounts reduced. Aircraft stainless tubes, increased on the average by 7½ per cent. Twelve per cent. chromium stainless tubes, increased by approximately 7½ per cent. Austenitic Cr Ni tubing, increased by 7½ per cent. Hot and cold drawn tubes to Admiralty specifications, increases of approximately 5 per cent. on hot finished and 2½ per cent. to 15 per cent. on cold drawn. Tube and pipe joints, increases of from 2 per cent. to 7 per cent. Malleable-iron pipe fittings, increased by approximately 6 per cent. Vertically cast and spun iron pipes and specials, increases of from 8d. to 27s. 3d. per yard on vertically cast and 4d. to 7s. 4d. per yard on spun; specials increased by £4 per ton. Cast-iron drain pipes to B.S.S.437, increased by approximately 7½ per cent. Angle cast pipes, increased by 25s. per ton.

Wire and Wire Products

Wire and Wire Products.—Mild-steel wire and products, increases of 1s. 3d per cwt. on free cuttnig; 6d. per cwt. on other lists; acid quality extra increased by 30s. per ton. Florists' wire, increases of 1½d. per doz. lbs. on Lists 1 and 1a. Stitching wire, increases of 6d. per cwt. on Lists 1 and 2; ½d. per doz. lbs. on List 3. Scaffold lashings, increased by 3d. per doz. lengths. Concrete mesh, increases of 2½ per cent. on low tensile and 4½ per cent. on high tensile. Brake cable and fine steel strand, increases of 6d. per cwt. on basic quality and 1s. 6d. per cwt. on acid quality. Special patented wire, increased by 6d. per cwt.; acid quality extra increased by 1s. 6d. per cwt. Wire netting, increased by 6½ points. Wire nails, increased by 1½ points. Chain link fencing, increased by 1 point. Patented steel roping wire, increases of 6d. per cwt. on basic quality and 1s. 6d. per cwt. on acid quality. Locked coil ropes, increases of 6d. and 1s. 6d. for basic and acid quality respectively. Wire ropes, prices increased. Those provided for on a per cwt. basis—basic quality by 6d. per cwt., acid quality by 1s. 6d. per cwt. Those procided for on a length basis—basic quality by ½ per cent., acid quality by 1½ per cent.; stainless, no change. Schedule re-edited.

Forgings.—Steel forgings, schedule completely re-edited with varying increases averaging 12 per cent. Steel forgings—ship work, no change. Steel forgings—red schedule, increased by 7½ per cent. Crank axles and parts, no change.

Steel Castings.—Increased in general by 4 per cent. Certain flexibility in prices introduced.

Railway Material

Railway Tyres, Wheels and Axles.—Railway tyres and axles, increases of £1 7s. 6d. per ton on tyres and £1 19s. 6d. per ton on axles. Wheels and axles—wagon, increased by from 3½ per cent. to 7½ per cent. Railway disc centres and brake van wheels, increased by 3½ per cent. Wheels and axles—carriage, increased by 3½ per cent. to 5½ per cent.

Springs.—Laminated railway springs, increases of 25s. per ton on bearing springs and 27s. 6d. on buffing springs. Railway coil springs, increased by 10 per cent.

Iron Castings.—Rainwater and soil pipes and gutters, wall gutters, and rainwater, soil and gutter connections, increased by 12½ per cent. and schedules re-edited. Cast-iron brake drums, increased by varying amounts.

Bolts, Nuts, Screws and Rivets.—Prices increased by varying amounts.

Miscellaneous.—Merchants' consolidated price schedule, revised to give effect to the general price changes. Old and waste material, no change. Delivery—I.O.W. and N.I., no change.

FOUNDRY INDUSTRY STATISTICS

The Council of Ironfoundry Associations has issued for the benefit of its members the "Statistics of the Iron Foundry Industry of the United Kingdom" (for the years 1939-1944). This is the first time in history that the British ironfoundry industry has published its own statistical record.

We should like future editions to include tables showing the quantity and value of imported foundry pig-iron; export details for foundry pig-iron; exports of various categories of castings, and perhaps machinery where the bulk is an aggregation of iron castings.

NOTES FROM THE BRANCHES

NEWCASTLE-UPON-TYNE BRANCH.—At the December meeting there was a unanimous feeling that the thanks of the branch were due to the Consett Iron Company, Limited, for the privilege of visiting the Consett Works in November. The reception of the members, the arrangements for the tour of coking plant and blast furnaces, the abie explanations given by the willing guides, tea, and the meeting which followed, were heartily appreciated. Members particularly wished to thank Mr. F. George, works manager, for his Paper giving a brief history of the firm, and the technical officials who so ably answered the various questions.

Mr. T. B. Burrows, branch-president, then explained that the present meeting would take the form of an open discussion. Members were divided into two groups, with approximately equal numbers of various professions and trades in each. Question, answer and discussion followed, and the variety of subjects indicated the keen interest felt.

The opening question, posed by Mr. B. Cunningham, put the meeting into the right mood for practical and academic discussion. He wished to know "Why, at the present time, is there so much call for metal to be super hot, whereas years ago, to the best of my recollection, foundries were satisfied with a good fluid, clean iron, with which little trouble was experienced?" This brought metallurgists to their feet, with arguments and counter arguments on design, strength, reduction in weight, laboratory control, alloy irons and other factors. Finally, Mr. E. B. Ellis and Mr. G. Elston (branch past-president), acting as arbiters, gave the verdict to scientific progress.

Succeeding questions ranged from sand mixtures and controls to the final machining of castings. When members dispersed, it was felt that while much had been learned, there was very much more which had not been touched upon, and a similar meeting in the future would be welcomed.

FALKIRK SECTION.—A change of programme had to be carried through at short notice for the December monthly meeting of the Falkirk section. The authors of the proposed short Papers were unable to present them at this time and a film was substituted. This covered resistance welding, and amply illustrated all aspects of the subject. Spot welding, butt-welding, seam welding, and projection welding were treated in turn, both from the theoretical as well as the practical point of view. Afterwards, a few points were further elucidated by Mr. D. Wilson, whose expert knowledge of the subject was greatly appreciated by the members. Mr. Thos. R. Goodwin, president of the section, was chairman, and suitably acknowledged the courtesy of Mr. Wm. W. Blair and his colleagues in arranging the presentation of the film. The meeting closed after the chairman had announced that the January meeting would consist of the presentation of a Paper on "Cupola Practice" by Mr. D. H. Young, of Glasgow, a past-president of the Scottish branch of the Institute.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.

A New Method of Feeding Applied to Castings Made in Static Moulds

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I have read with great interest the above article in recent issues of THE FOUNDRY TRADE JOURNAL, and would congratulate the Authors on this publication. Their sustained efforts and achievement in the side feeding of steel castings make an outstanding contribution to steel foundry practice.

I should like to ask the Authors if they use aluminium wire to secure the article "Kayell" in the

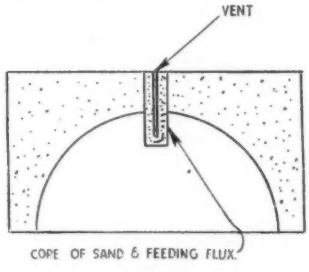


FIG. 1.

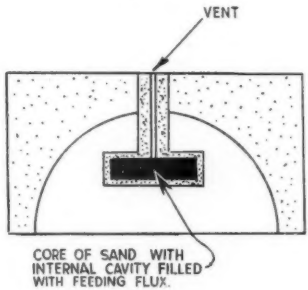


FIG. 2.

head metal. Being interested in this work modest efforts have been made as shown in Figs. 1 and 2. Have the Authors any advice to offer whether this principle is worth developing, seeing that we are still experimenting with the atmospheric finger loss?

Yours, etc.,

E. G. KELLY.

Glascoed, Lan Park Road,
Pontypridd.

MR. L. EDINGER, of the Barnett Foundry & Machine Company, Irvington, N.J., has been elected president of the [American] Gray Iron Founders' Society.

NEW YEAR HONOURS

AWARDS TO SCIENTISTS AND INDUSTRIALISTS

The first part of the New Year Honours List, published last week, includes details of awards to many people associated with the iron and steel, and allied industries. Brief notes on some of the honours are given below.

Knights Bachelor

MR. GEORGE PERRIN CHRISTOPHER, director, commercial services, Ministry of War Transport. He is a director of the Roath Engineering Company, Limited.

DR. CHARLES FREDERICK GOODEVE, director of the British Iron and Steel Research Association. Prior to joining the B.I.S.R.A., Dr. Goodeve was Deputy Controller, Research and Development, Admiralty. He is the author of numerous scientific works.

PROF. IAN MORRIS HEILBRON, lately scientific adviser, Ministry of Production. Since 1938 he has been professor of organic chemistry, University of London, Imperial College of Science and Technology. He was vice-president and Longstaff Medallist of the Chemical Society in 1939. During the war years Prof. Heilbron has been a member of the Chemical Defence Committee, Ministry of Supply, scientific adviser to the Director of Scientific Research, Ministry of Supply, and a member of the Advisory Council on Scientific Research and Technical Development of that Ministry.

COMMANDER EDWARD ROBERT MICKLEM, R.N. (Retired), is deputy chairman and managing director of Vickers-Armstrongs, Limited, and chairman of Cooke, Troughton & Simms, Limited, and a director of the English Steel Corporation, Limited, Mitchell Bearings, Limited, Palmers Hebburn Company, Limited, North Eastern Trading Estates, Limited, and Vickers, Limited.

MR. ALEXANDER MURRAY STEPHEN, chairman, Alexander Stephen & Sons, Limited, shipbuilders and marine engineers, Glasgow. He is a director of the London Midland & Scottish Railway Company, R. & J. Dick, Limited, the Steel Company of Scotland, Limited, and a number of other companies.

MAJOR ROBERT NORMAN THOMPSON, chairman, Joseph L. Thompson & Sons, Limited, Sunderland. Major Thompson, who receives his award for services to shipbuilding, is also chairman of Sir W. G. Armstrong, Whitworth & Company (Shipbuilders), Limited, and a director of National Shipbuilders Security, Limited, and Sir James Laing & Sons, Limited.

Order of the British Empire

G.B.E.

SIR EDWARD VICTOR APPLETON, secretary, Department of Scientific and Industrial Research since 1939.

C.B.E.

PROF. JAMES LESLIE BRIERLY, chairman of wages councils, Ministry of Labour and National Service.

MR. JOHN BROWN, general secretary, Iron and Steel Trades Confederation.

DR. STANLEY FABES DOREY, chief engineer surveyor, Lloyd's Register of Shipping, since 1932. Dr. Dorey, who has been well known in marine engineering circles for many years, is a vice-president of the Institution of Marine Engineers and of the Institute of Metals. He is a member of Council of the Institution of Mechanical Engineers, the Institute of Naval Architects and of the Institute of Welding. He is a member of numerous technical and research committees.

MR. GEORGE ROBERT DISRAELI HOGG, assistant secretary, Department of Scientific and Industrial Research.

MR. GERALD WILLIAM LACEY, lately Controller of Light Metals, Ministry of Aircraft Production.

MR. ALBERT JOHN PHILPOT, director of research and secretary, British Scientific Instrument Research Association.

MR. CECIL GEORGE HERBERT RICHARDSON, joint managing director, Ransome & Marles Bearing Company, Limited.

O.B.E.

MR. GEORGE DODDS M'LAREN, Convener of Stirlingshire. He is chairman of the National Executive of the Ironfounding Workers' Association.

Companion of Honour

PROF. ARCHIBALD VIVIAN HILL, a secretary of the Royal Society, for scientific services. Prof. Hill has been Foulerton Research Professor, Royal Society, since 1926, and secretary since 1935. He has been chairman of the Scientific Section Central Register since 1939, a member of the Executive committee of the National Physical Laboratory since 1940, and a member of the War Cabinet Scientific Advisory Committee and of the Scientific Advisory Council, Ministry of Supply Advisory Council, D.S.I.R.

STABILISING ZIRCONIA REFRACTORIES

Although zirconia has been used for several years as an opacifier in enamels and to some extent in glazes, its use as a refractory has not increased, even though it is available in a very pure state at comparatively low cost and possesses many valuable properties such as high melting point, chemical stability, and hardness. Its disadvantage is that when made into refractory shapes these are inclined to disintegrate rather rapidly. This disintegration can be eliminated by the addition of certain oxides that stabilise the crystal form of the material, and by special heat-treatment, says R. F. GELLER, of the U.S. National Bureau of Standards. Experiments were made using the oxides of cerium, yttrium, silicon, magnesium, and calcium. The specimens of these mixtures were heated to various temperatures and their length changes determined during both heating and cooling. The results showed that irregular thermal length changes were prevented. However, expansion during heating and contraction while cooling were always relatively high, and although the tendency to structural disintegration was overcome, the resistance of the material to severe thermal shock was still comparatively low.

THE PHOSPHOR BRONZE COMPANY, LIMITED, of Birch Road, Witton, Birmingham, 6, announce that a second edition of their costing booklet is now available. The charge is 12s. 6d. per copy.

PLANT AND EQUIPMENT FROM GERMANY

TECHNICAL INTELLIGENCE ALSO

The Board of Trade expects to provide British industry with valuable assistance from Germany during the next year or so as a result of investigations and action now being taken. According to an article in the "Board of Trade Journal," the Board's responsibilities in the German field fall under three main headings:—Reparations; procurement and dissemination to British industry of technical intelligence; obtaining for British industry the services of German scientific and technical personnel.

All these functions can be covered by the word reparations if that word is used in a wide sense. The plan for reparations in the narrow sense will give, it is hoped, German plant and equipment for installation in this country. Under the other two headings, the Board is attempting to add to the value of physical reparations by making available to British industry, German technique and ingenuity in the form either of technical intelligence or of human hands and brains. Many Government departments are interested in this field, and it is left for each department to deal with the industry or industries with which it has the closest contact. The Board of Trade is the focus at which demands are centralised and from which information is disseminated.

Industrial Plant

As was agreed at Potsdam, the Control Council is engaged in determining the amount and character of the industrial plant and equipment which will be surplus to Germany's peacetime needs and therefore available for reparation deliveries. Pending the completion of this task, a certain number of plants in the Western zones are being declared surplus and made available for advance deliveries. To date some 60 plants have been so scheduled, including the Krupps works at Essen, a large I.G. Farben dye plant and the Blohm & Voss shipbuilding yards at Hamburg.

Lists of plants declared surplus to German requirements are circulated from time to time by the Control Council to the countries entitled to receive reparations, who are given a fortnight within which to make known to the Control Council those plants in which they are interested. The next step is to allocate the plants as between Russia (and Poland) on the one hand and the rest of the reparation claimants on the other. (Under the Potsdam agreement, Russia is entitled to 25 per cent. by value of the "surplus" capital equipment in the British, American and French zones of occupation.) Finally, the share allotted to the Powers other than Russia and Poland will have to be divided up between them. For this purpose, an Inter-Allied Reparations Agency will be set up in Brussels.

To assist the Government in deciding what plants to claim as reparations, a series of expert teams is being organised from the various industries to inspect capital plant and equipment in the Western zones. To start with, the selection of these teams has been confined to those industries from which advance deliveries are likely to be made. These are the industries which in view of their significance for war potential are expected to provide substantial surpluses of plant and equipment—namely, the armament, aircraft and shipbuilding industries and those producing metals, chemicals and machinery directly necessary for war economy. The despatch of the inspecting teams started at the beginning of November, and already more than one hundred teams have left this country.

The disposal of the plant and equipment acquired under reparations will present a number of problems, and attention is now being given to planning the machinery for this disposal and to working out the principles by which it should be guided.

Admission of Technicians

The Government have recently sanctioned proposals for admitting to the United Kingdom a limited number of German scientists and technicians to assist in the development of British industry. It has been laid down that apart from security considerations, the following safeguards must be observed:—Numbers must be left low, and only those admitted who have an important contribution to make; no one should be brought in to do work that can be done by a British subject; those who are admitted should as far as possible be employed in Government establishments or research associations rather than in individual firms. The Board of Trade has set up an inter-departmental panel under the chairmanship of Sir Charles Darwin, Director of the National Physical Laboratory, to work out the details of the scheme and to ensure that uniform standards are maintained and that the necessary safeguards are observed. Those Germans who come to this country under the scheme will come as volunteers.

PHOTO-ELASTICITY

Photo-elasticity as a method of exploring stress distributions was the subject of a Paper entitled "Photo-elasticity: Modern Methods and their Application to Engineering Problems," read by A. A. WELLS at a meeting of the Scottish Engineering Students' Association at Glasgow. The author emphasised that photo-elastic models, like all other model experiments, can never give a complete solution as to the conditions obtaining in a prototype. They must be used in conjunction with full-scale trials and past experience. Their great value lies in the comparative results which can be obtained at the outset. Alternative designs can be produced on the model scale quite cheaply. They can be modified easily, and an insight can be obtained into the function of the various parts of the structure. The best designs can then be picked out for consideration on a larger scale.

THE SEPTEMBER-OCTOBER issue of "Técnica Metalúrgica" (Barcelona) contains a lengthy appreciation of the life and work of the late Dr. W. H. Hatfield by Señor Emilio Gimeno Gil, Dean of the Faculty of Science of the University of Madrid.

NEWS IN BRIEF

IRON AND STEEL IMPORTS into the Tyne during the 10 months ended October last amounted to 22,410 tons, compared with 151,169 tons in 1944 and 77,279 tons in 1938. Exports of iron and steel manufactures amounted to 23,748 tons, against 14,961 tons in 1944.

GRAFTON TOOLS, LIMITED, of Station Works, Colindale Avenue, London, N.W., is opening up a new foundry at Gas House Lane, Hertford, where the intention is to make high-grade alloy steel and iron castings for their own use as manufacturers of a line of machine tools.

FIGURES OF 1945 export business announced by the Ford Motor Company, Limited, show that the company's total export turnover to November 30 was £1,477,194. Over one-fifth of this value—actually 22 per cent.—was exported in the month of November, and it is estimated that the total export turnover for the year will be £1,750,000.

HUNTINGTON, HEBERLEIN & COMPANY, LIMITED, chemical and metallurgical engineers, have removed from their wartime premises in North Wales and opened offices at 114, Cromwell Road, London, S.W.7. For the time being the sintering department will remain at 17, High Street, Redbourn, in charge of Mr. R. H. Bingham.

ABOUT 175 REPRESENTATIVES of Meehanite foundries in the United States, Canada and abroad attended the annual meeting of the Meehanite Research Institute, New Rochelle, N.Y., held in New York on November 15, 16 and 17. As is the custom, some 45 Papers were presented on foundry practice, engineering, metallurgy, and sales.

ACCORDING TO our own correspondent, in the Midland region, comprising five counties, total vacancies for all foundries is only 1,851 men, and probably fewer than 1,000 are needed for builders' castings. There is no likelihood of labour being directed out of the district, and it is probable that the area will be able to meet its own needs.

THE COMPANIES REGISTRATION OFFICE gives notice that the names of the undermentioned companies have been struck off the register, and such companies are dissolved:—Bejay Engineering Company, Limited; Collins Green Colliery Company, Limited; McLellan Engineering Company, Limited; S.M.H. Engineers, Limited; Southern Silica, Limited; Zetland Engineering Company, Limited.

A REPRESENTATIVE of Alexander Wilson (Aberdeen), Limited, engineers and ironfounders, etc., recently told our Scottish correspondent that their biggest trouble was raw material shortage in the form of iron castings, which in turn was caused by shortage of moulders. They had lost more men in the last six months than in the last six years. Men were being taken away, but not a single man had come out of the forces, he added.

THE KIRUNA IRON ORE COMPANY, which owns the whole of the railway, harbour and loading facilities at Narvik, estimates that most of the reconstruction work will be completed within six to eight months. The port's export capacity is at present 25 per cent. of the pre-war level, *i.e.*, about 2,000,000 tons of ore a year. By next spring export capacity should be 75 per cent. of the pre-war figure, which was about 7,000,000 tons of ore. Of this about 60 per cent. went to Germany, 20 per cent. to Britain, and 8 per cent. to the United States.

THE BOARD OF TRADE, by arrangement with the Postmaster-General, have made a general Licence authorising business communication with Austria. British firms and firms in Austria may exchange business information with a view to the future resumption of business relationships. Banks and other financial institutions may now reply to requests for information from their depositors in Austria. The resumption of private trade is not yet permissible and Austrian-owned property in the United Kingdom continues to be under the control of the Trading with the Enemy Department and the Custodians of Enemy Property.

ALTHOUGH SERIOUSLY DAMAGED by American air attacks last April, the Skoda works in Czechoslovakia are again in operation, at about a quarter of their previous production capacity. Some 18,000 workers have already resumed work, but engineers estimate that it will be at least 18 months before the works can again reach their normal output. They are at present wholly engaged on the production of railway material for the reconstruction of the Czech railways, which were almost entirely destroyed. Locomotives damaged by air attack are being repaired in the works, and spare parts for passenger coaches and wagons. Bridge materials are also being produced.

TO ASSIST IN the post-war planning of Glasgow, a consultative committee representative of bodies outside the Corporation may be set up. A meeting was held in the City Chambers on December 27 at which representatives of the Corporation Sub-committee on Post-war Planning, the Scottish Council on Industry, Glasgow Chamber of Commerce, North-West Engineering Trades Employers' Association, Clyde Shipbuilders' Association, and Glasgow Trades Council were present. It was decided to recommend to the Corporation that a committee be formed to be known as the Post-war Consultative Committee. The purpose of the committee would be to consider matters relating to the industrial development of the city and the diversification and expansion of industry.

TECHNICAL SERVICE FOR SOUTH AMERICAN TUBE BUYERS

Tube Investments, Limited, announce the registration in the Argentine of a new subsidiary company, Tubes Britanicos (Argentina), S.R., Ltda., to provide a technical advisory service for South American purchasers of British steel tubes. This development follows the recent return from South America of a technical trading mission, which made an extensive study of steel tube needs and demands in the Argentine, Brazil, Chile, Peru, Uruguay, and Bolivia. The resident English director of the new company, Mr. R. D. Young, was formerly production manager of the Desford works of the Tube Investments subsidiary company, Tube Products, Limited.

The High-Quality Iron for High-Duty Castings.

Made in seven standard grades or to individual requirements, this iron has a close grain structure and fine graphitic carbon content. It replaces Hematite, and tones up high phosphorus irons.

We also make Dale Refined Malleable Iron to any required specification.

PERSONAL

SIR HUMPHREY NOBLE, who has been awarded the O.B.E., is a director of John Spencer & Sons (1928), Limited, Newburn Steelworks, Newburn, Northumberland.

MR. S. G. SARGENT, after 50 years' service as works manager with John Spencer, Limited, now a subsidiary of Stewarts and Lloyds, Limited, has retired. He received a presentation from the staff and workpeople.

MR. ERNEST WARD, who has retired from the service of the Staveley Coal & Iron Company, Limited, has been presented with a cheque from the staff of the foundries.

MR. J. L. HARRISON, steel plant manager for Thos. Firth & John Brown, Limited, at Scunthorpe, is leaving to take up a similar position with Catton & Company, Limited, of Hunslet, Leeds.

MR. WILLIAM DAVIDSON, foreman patternmaker with M. Cockburn & Company, Limited, Gowanbank Ironworks, Falkirk, has retired after 60 years' service in the ironfounding industry, nearly all with this firm.

MR. F. WOODIFIELD has been appointed works manager of the Park Gate Iron & Steel Company, Limited. Other appointments are: Commercial manager, MR. J. W. CARR; secretary, MR. D. E. NUTBROWN; chief engineer, MR. W. S. ALLEN.

MR. W. B. CLARKE has retired from the service of Ransomes & Rapier, Limited, after more than 46 years with the company, the last 25 years as buyer, and has received a presentation from the office and works departments to mark the occasion.

MR. JOHN W. BAKER has relinquished the chairmanship of John Baker & Bessemer, Limited, Rotherham, and has been succeeded by MR. GEORGE BAKER. Mr. John W. Baker retains his seat on the board of directors. MR. EDWARD BAKER and MR. S. E. BAKER have been appointed joint managing directors.

MR. STANLEY EVANS, who for 16 years has been secretary of Darwins, Limited, Sheffield, and for a shorter period of Andrews Toledo, Limited, the Wardsend Steel Company, Limited, and other subsidiary companies has resigned to accept an appointment as secretary of Associated British Engineering, Limited, of London, and its subsidiaries.

MR. GEORGE STRACHAN, who served his apprenticeship with the Fairfield Shipbuilding & Engineering Company, Limited, succeeded his father, MR. ROBERT STRACHAN, as engineering director with the firm as from January 1. MR. ROBERT STRACHAN has retired after 56 years' service. His brother, the late Mr. George Strachan, served nearly 60 years in the same establishment.

MR. A. FAGE, F.R.S., has been appointed superintendent of the Aerodynamics Division of the National Physical Laboratory, with effect from January 1, to fill the vacancy caused by the resignation of MR. E. F. RELF, F.R.S., who is taking up the post of Principal of the College of Aeronautics. Mr. Fage has been a member of the staff of the National Physical Laboratory since 1914.

MR. F. H. ROLT will become superintendent of the Metrology Division of the National Physical Laboratory, with effect from April 1, 1946, on the retirement from that post of MR. J. E. SEARS. Mr. Rolt has been a member of the staff of the N.P.L. since 1912, but during the war his services have been lent to the Ministry of Supply, where he has held the post of Director of Jigs, Tools and Gauges.

MR. A. PARKINSON has relinquished his positions of vice-chairman and joint managing director of Crompton Parkinson, Limited, as from January 1. He retains his seat on the board. MR. E. C. HOLROYDE ceases to be a joint managing director, but retains his seat on the board. MR. F. LE NEVE-FOSTER ceases to be a director. MR. J. HARWOOD FRYER has been appointed a director and also a joint managing director. He ceases to be an executive director and the secretary. MR. C. F. DICKSON has been appointed a director and ceases to be an executive director. MR. T. H. WINDIBANK has been appointed a director and ceases to be an executive director. MR. H. FAWCETT has been appointed the secretary. MR. J. C. HOLMES has been appointed chief accountant.

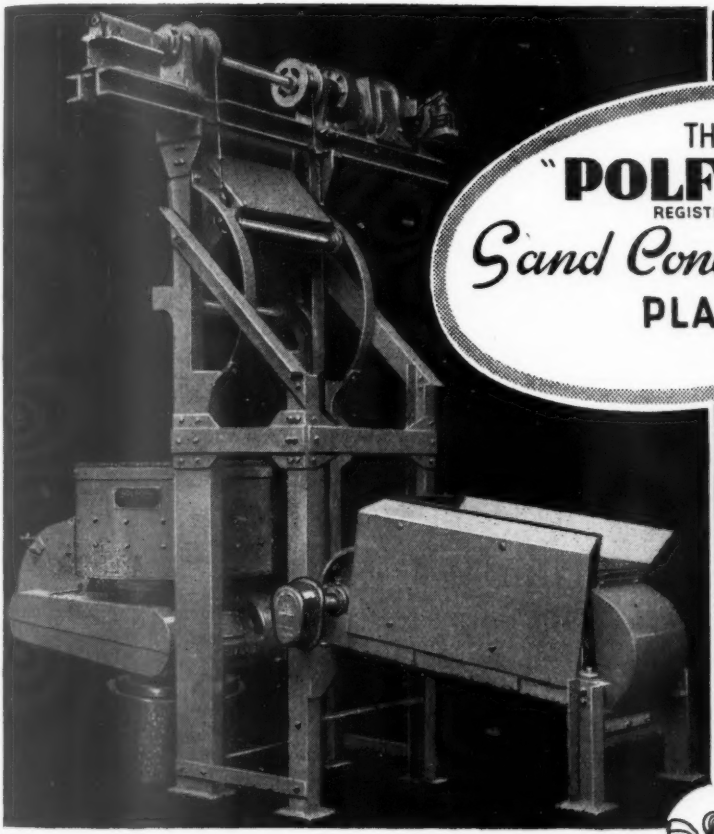
H. A. BRASSERT & COMPANY, LIMITED

Mr. H. A. Brassert, chairman of H. A. Brassert & Company, Limited, is retiring from this company, in order to concentrate his activities in his American company in New York, from where he will continue to handle their consulting and engineering business. The engineering business of H. A. Brassert & Company, Limited, has, therefore, been transferred to a new company, under the name of John Miles & Partners (London), Limited. The new company has succeeded to the goodwill, drawings, patents and processes of H. A. Brassert & Company, Limited, together with the engineering business. It is retaining the services of the staff, all of whom have been actively engaged upon the planning, designing and construction of the large iron and steel and other engineering projects carried out by H. A. Brassert & Company, Limited.

The directors of the new company are:—Mr. John Miles, chairman and managing director, Mr. T. Thomson, Mr. A. G. E. Robiette, Mr. J. R. Thring, secretary, and Mr. T. Rudkin.

John Miles & Partners (London), Limited, will act as consultants on the same lines as H. A. Brassert & Company, Limited, on the layout, design and construction of plant and equipment, and on the methods and processes of operation in all branches of heavy engineering, particularly in the fields of coal carbonisation, iron and steel manufacture and rolling of steel products. They have also opened a new department for consulting in the non-ferrous metal industry. The new concern has made arrangements with H. A. Brassert & Company, New York, and Mr. George Danforth, Jr., president of the Open Hearth Combustion Company, Chicago, together with other experts in America in the iron and steel and allied industries, whereby they can call on their experience when required. The registered office is: Granite House, Cannon Street, London, E.C.4.

PAT. No. 570997.



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SOLE AGENTS :

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TELEPHONE: 26311 TELEGRAMS: FORWARD SHEFFIELD

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Moulds & Tools—£2,000. A. and M. J. Barber, 482, Otley Road, Adel, Leeds.

Charles Rice Engineering, 22, Church Lane, London, N.8—£1,000. C. R. and M. E. Rice.

Reekie Engineering Company—£8,000. J. M., and G. R. Reekie, Worth Park, Sussex.

United Engineering Company (Blackheath), Victoria Road, Blackheath—£600. H. and N. Underhill.

Kenwall Engineers, 44, Chepstow Road, Newport, Mon—£5,000. K. M. Walters and J. E. Howard.

Countership Engineering Company—£10,000. J. B. Williams, 18, Austin Friars, London, E.C.2, subscriber.

Dorchester Engineering Company, Waterloo Buildings, Cases Street, Liverpool—£20,000. J. and C. Moores.

Guyrex Equipment, 25, Craven Street, Strand, London, W.C.2—Engineers, etc. £5,000. G. Richards and R. Ling.

J. F. Coster (Engineers), 219, Gloucester Road, Croydon—£1,000. J. F. and B. E. Coster, and G. W. Yeo.

S. H. Bridson, 28, Baldwin Street, Bristol—Engineering agents, etc. £2,500. S. H. Bridson, D. B. Vallance, and E. A. Hull.

A. D. Wood & Company, 16, Aston Lane, Perry Barr, Birmingham—Engineers. £10,000. A. D., T. A., and D. H. Wood.

C. & A. Macmillan, 1, Quality Court, London, W.C.2—Metal turners, die stampers, etc. £100. C. W. and A. E. Macmillan.

Reason Engineering Company, 25, Park Mansions, Hendon Way, London, N.W.4—£1,000. H. M. Williams and J. McAllister.

English Bridge & Structural Engineering Company, Crusoe Farm, Arnold Road, Mitcham, Surrey—£1,000. R. Saunders and B. L. Clark.

Frederick Ellis (Engineers), 60, Hatcham Road, London, S.E.16—£4,000. J., F. C., and E. S. Thompson, and F. J. C. Ellis.

J. G. Mackenzie & A. N. Porter, 67, Wellington Hill West, Bristol, 9—Engineers. £2,000. K. G. Mackenzie and A. N. Porter.

Waddington & Goodwell, 34-35, Hatton Garden, London, E.C.1—Engineers, tool makers, etc. £1,000. C. W. and I. M. Waddington.

Rook Bros., 5, Saffron Road, Romford—Gas plant, mechanical and electrical engineers, etc. £1,000. G. E., G. T., and S. H. Rook.

Clifford Machine Tools, Burbidge Road, Bordesley Green, Birmingham, 9—£100. S. C. and C. S. Joseph, W. R. Wheeler, and H. J. Lea.

Danell Metal Products, Quill Lane, London, S.W.15—Manufacturers of light metal products, etc. £200. C. J. Hurrell and F. W. Daniels.

Aluminium Die Castings (Erdington), 793, Chester Road, Erdington, Birmingham—£100. P. L. Dicker, A. O. Bailey, and N. O. March.

G. A. Smith Company (Desborough), Precision Works, Federation Avenue, Desborough, Northants—Machinery manufacturers. £3,000.

Engineering Productions (Clevedon), Coleridge Vale Works, Coleridge Vale Road, Clevedon, Som.—£6,000. C. V. O. and J. E. Binding.

Conowelding Company, The Willows, Landore, Swansea—Electric and oxy-acetylene welders, etc. £500. L. C. Cooper and J. Noakes.

Jeremiah Jackson, Alma Mill, Walsden, Todmorden—Engineers and brassfounders. £2,000. M. E. Jackson, D. Sutcliffe, and H. Stansfield.

Dunton & Marston, Reliance Foundry, Wednesfield Road, Willenhall, Staffs—Non-ferrous metal founders. £5,000. F. B. Dunton and H. Marston.

Mayston & Partners, 45/52, Church Road, Barnes, London, S.W.13—General engineers, etc. £900. R. C. Mayston, D. A. Gunn, and J. W. Martin.

CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

London, S.W.1, January 31—Sewer castings, tools, iron, steel, etc., for the Lambeth Borough Council. Mr. G. H. Buckett, Town Hall, Brixton Hill, London, S.W.2.

Colne Valley, January 30—Cast-iron gully grates and frames, manhole covers and frames, for the Urban District Council. The Surveyor's Office, Council Offices, Marsden, Huddersfield.

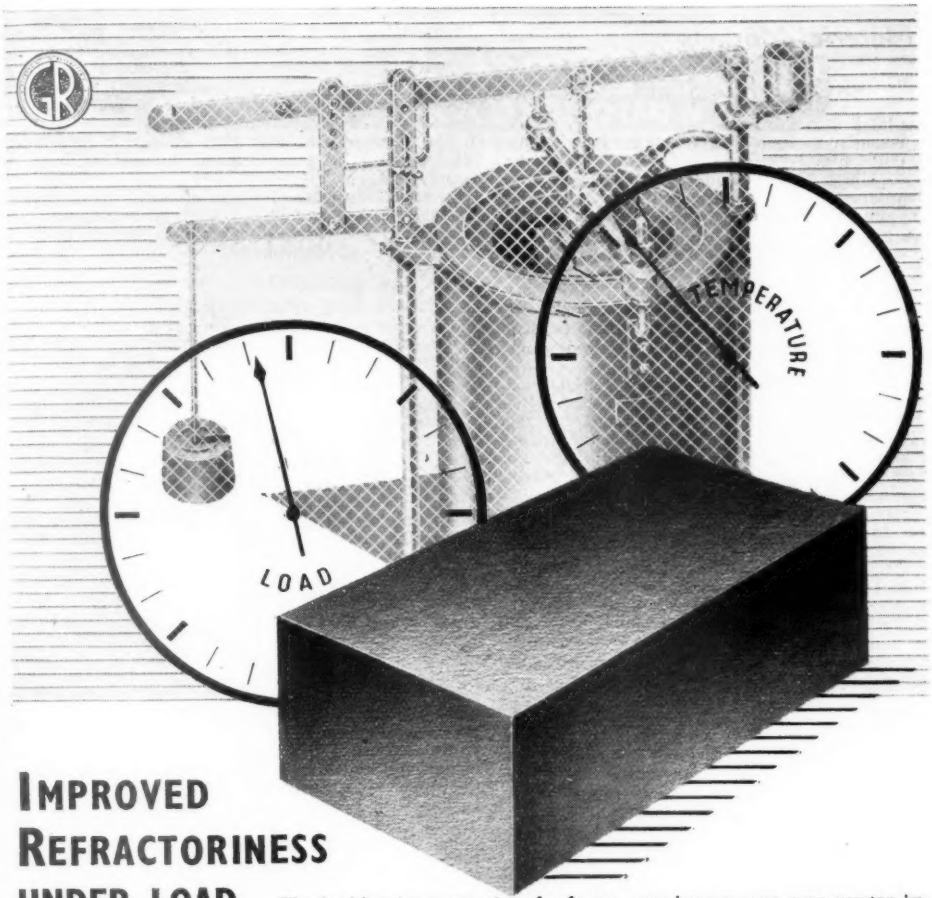
London, N., January 18—Castings, lamp columns, hydrants, etc., tools, for the Borough Council. Mr. J. T. W. Peat, borough engineer and surveyor, Southgate Town Hall, London, N.13.

Wigton, January 14—Provision, laying and jointing of 1,560 yds. of 4-in. and 3-in. spun-iron water mains, etc., for the Rural District Council. Rural District Council Offices, George Street, Wigton.

Helmsley, January 17—Provision and laying of 1,150 yds. of 4-in. dia., and 250 yds. of 3-in. dia. spun-iron pipes, etc., for the Rural District Council. Mr. A. Brooksbank, 14, The Exchange, Bradford, Yorks.

Bootle, January 26—Cast-iron manhole covers and gully grates, tools, bolts, screws, nails, rivets, etc., for the Borough Council. Mr. W. A. Harrison, borough engineer and surveyor, Town Hall, Bootle.

Beverley—Supply and laying of 1,400 yds. of 4-in. dia. spun-iron mains, etc., for the Rural District Council. Consulting Engineer, 4, Queen Square, Woodhouse Lane, Leeds, 2. (Fee £2 2s., returnable.)



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Raw Material Markets

IRON AND STEEL

Ministerial direction of young men into the foundries, which is essential if the production of castings for the building trade is to be stepped up, will mean also the provision of ampler tonnages of high-phosphorus iron. Current production is fully absorbed, and stocks are low. Despite difficulties, the output of foundry iron will have to be increased. The pig-iron stringency is confined solely to this one particular grade. Forge iron is readily obtainable, while makers of low- and medium- phosphorus, refined and hematite irons are all seeking business. In recent weeks transactions have been on a limited scale, but now that the new licences have been issued trading is expected to develop on more liberal lines.

The necessity for continued imports of semi-finished steel on a substantial scale is clearly indicated. Re-rollers have an abundance of work in hand, but the tonnages of steel provided by home producers fall consistently short of their requirements and will have to be augmented from another source. The most urgent call is for more billets. Sheet mills are not so badly off for bars, but there is a shortage of square and flat billets, and defectives are eagerly accepted by rollers of special sections, etc.

All the finishing trades commenced the year with very substantial bookings in hand and in some branches there is little scope for further acceptances within the limits of Period I. Rollers of plates and sections are assured of full employment for at least three months ahead and their chief difficulty is in securing transport to consumers at home and overseas. Stockyards are becoming congested owing to the shortage of trucks, while shipping facilities still exercise a limiting influence on the export trade.

Rail mills are making a substantial contribution to the export drive and a heavy foreign demand for sheets can only be partially satisfied owing to urgent home requirements. Only a very small proportion of the output of sheets can be galvanised, but with speedier demobilisation it should soon be possible to increase the number of galvanising pots. Colliery requirements are also on an increased scale and bookings for the current period are extensive.

NON-FERROUS METALS

It is believed that an agreement, in broad terms, has been reached between the Rhodesian copper producers and the Ministry of Supply, for the bulk purchase of all available copper for sale to Britain for the first six months of 1946. This does not mean, however, that the entire Rhodesian output will come to this country; the producers also have contracts to supply other markets. Meanwhile, a slackening in the home trade is evident. This, however, should be only momentary, for prospects for the copper and brass trades are exceedingly bright.

Licences for lead buying are still restricted by the Directorate. With the prospect of the price of the metal rising, lead consumers have not the opportunity of covering themselves to any degree. The shortage of lead in America has assumed serious proportions. Government stocks are expected to be drawn upon to the tone of 20,000 short tons monthly.

The price of zinc also gives cause for speculation. This metal is in great demand, despite an improved supply position.

A revised estimate of stocks of metal tin, discovered in Malaya, is given by the Ministry of Supply. The new figure is 4,500 tons. Details of the stocks of tin ore are not yet forthcoming.

OBITUARY

SIR ARCHIBALD MITCHELSON has died at Coombe Hill, Surrey, aged 67. He was chairman of J. Samuel White & Company, Limited.

MR. JOHN MOORE, who for many years had carried on business as a metal merchant at Stafford and Nuneaton, has died at the age of 63.

MR. JOHN LESLIE WOLSTENHOLME, chief buyer at the Vickers Works of the English Steel Corporation, Limited, Sheffield, died suddenly, aged 43. Mr. Wolstenholme served an engineering apprenticeship with Cammell Laird & Company, Limited, was transferred to the English Steel Corporation on its formation, became assistant to the chief buyer, and was appointed chief buyer in 1936.

MR. EDGAR PAM, a director of the Mond Nickel Company, Limited, and president of the Institution of Mining and Metallurgy, died last month. A mining engineer by profession, Mr. Pam received his early training at the Royal School of Mines and was engaged for many years with the Central Mining & Investment Corporation, Limited, in South Africa, with whom he had a distinguished career and eventually became general manager of the Modderfontein East, Limited. During the war of 1914-18 Mr. Pam saw service with the Royal Engineers in France, where his mining experience was of considerable value in the military tunnelling operations. He retired from the Army with the rank of Lieutenant-Colonel and was awarded the O.B.E., Military Division. Mr. Pam joined the Mond Nickel Company in 1928 as consulting mining engineer and, after the merger with the International Nickel Company, he was appointed assistant to the delegate director and subsequently deputy delegate director. In the spring of 1945 he became a member of the Mond board. He was closely concerned with the company's operations in Northern Finland down to the time of the outbreak of war there.

THE OUTPUT of new tonnage from the Wear shipyards during 1945 totalled 48 ships of 218,175 gross tons, with a number of tugs and frigates in addition.

MR. TOM MAKEMSON, Director of Iron Castings, Iron and Steel Control, and secretary of the Institute of British Foundrymen, has been awarded the M.B.E. in the New Year Honours List.